REMARKS

Claims 1-19 remain in the application as amended.

Before addressing the Office Action, preliminary remarks concerning the foregoing amendments to the specification and claims are in order.

Amendments to the Specification and Claims

The specification and claims have been amended along the lines of the application as originally filed, but with clarification. For example, the paragraph added at page 2 between lines 14-22, and the amendment to claim 1, specify that the light energy that is directed onto the sensor is the energy that is reflected from portions of the outer and inner wall surfaces of the container that are perpendicular to the light energy directed onto the container as viewed from a direction parallel to the container axis. For example, referring to application FIGS. 3-6, it will be seen that the light energy 40 (FIG. 6) is reflected from the surface portion of container sidewall 38 that is perpendicular to incident energy 35 and directed onto sensor 48, whereas the light energies 40a and 40b that are reflected from points on the container surface that are not perpendicular to the incident light beam 35, as viewed from the direction of the container axis (FIGS. 3-4 and 6), are not directed onto the sensor 48. Thus, in short, these portions of the text and claims have been clarified, as compared with the application as filed, by pointing out that the surface perpendicularity is as viewed from the direction of the container axis, which is the direction of view in FIGS. 3, 4 and 6.

Similar amendments have been made at pages 3 and 6 of the text, and in claim 9.

Turning to the Office Action:

Claim Rejections - 35 USC 112

Claim 5, step (b) has been amended to make clear that the light energy is directed onto each container at an angle to the axis of the container (FIG. 2). The light energy that is directed onto the sensor in step (c) of claim 5 is the light energy reflected from the inner and outer container wall surfaces along light paths coplanar with the container axis. This is clearly shown in FIGS. 3, 4 and 6 of the application drawings, and described in the text. The light rays 35 in FIG. 3 are parallel to each other. The light ray that is traveling in a plane that includes the container axis will generate the reflection ray 40 from the outer surface of the container, and the reflection ray 44 from the inner surface of the container (FIG. 5), which will also be coplanar with the container axis.

Claim Rejections - Prior Art

All claims of the present application have been rejected over the combination of Gast 6,172,355 and Brand 4,822,171.[1] Reconsideration is respectfully requested

In general, the present invention is directed to an apparatus and method for measuring the wall thickness of a transparent container while the container is moved transversely of its axis along a defined path and simultaneously rotated about its axis. Light energy is directed onto the wall of the container as it rotates and translates, and portions of the light energy reflected from the inner and outer wall surfaces of the container are directed onto a light sensor. Wall thickness is measured as a function of the light

[1] The rejection of claims 1, 5 and 9 is with the caveat "as far as the claim is understood." Claims 1 and 9 have not been objected to or rejected under 35 USC 112, so it is not at all clear what the caveat "as far as the claim is understood" is intended to convey with respect to these claims.

energy reflected onto the sensor. Claim 1 specifies that the light energy directed onto the container is a line-shaped beam having a long dimension perpendicular to the axis of the container and parallel to the direction of translation of the container. The light energy that is reflected onto the sensor is the light energy reflected from the portions of the outer and inner wall surfaces of the container that are perpendicular to the light energy directed onto the container as viewed from a direction parallel to the container axis - i.e. as viewed from the direction of application FIGS. 3, 4 and 6 as discussed above. Container wall thickness is measured as a function of the separation at the sensor between the light energies reflected from the inner and outer wall surfaces.

Claim 5 recites that the light energy is directed onto each container at an angle to the axis of the container. The light energies that are directed onto the light sensor are the portions reflected from the inner and outer wall surfaces along light paths coplanar with the container axis, which again has been discussed above in connection with FIGS. 3, 4 and 6. Wall thickness is measured as a function of the separation at the sensor between the light energies reflected from the inner and outer wall surfaces.

Claim 9 recites a light source and an illumination system for directing onto a wall of the container, as it passes through the inspection station, a line-shaped light beam having a long dimension perpendicular to the axis of the container and parallel to the direction of movement of the container through the inspection station. The reflected light energies that are directed onto the sensor are those reflected from the portions of the inner and outer wall surfaces that are perpendicular to the light energy directed onto the container as viewed from a direction parallel to the container axis. An information

processor is responsive to the light energy directed onto the sensor for determining thickness of the container between the outer and inner wall surfaces.

The Gast patent is, of course, one of the patents cited at page 6, line 20 of the text as filed, as disclosing a conveyer suitable for simultaneously translating and rotating containers through an electro-optical inspection station. It is respectfully submitted that the Brand reference is not combinable with the Gast patent, to teach the present invention or otherwise, as suggested by the Examiner.

The Brand reference discloses a system for measuring wall thickness of a glass tube 8. In systems of the type disclosed and Brand, the glass tube is normally moving in the direction of its length, although this is not mentioned in Brand and is not particularly important to the present analysis. What is important is that there is no disclosure in Brand of rotating the tube around its axis or, even more importantly, translating the tube in a direction transverse to its axis. In the Brand disclosure, a line-shaped light beam 9 is directed onto the outer surface of the tube 8, and is caused to dither along the outer surface by operation of the mirror 5. Light energies 10,11 reflected from the outer and inner surfaces of the tube are directed through a stop 19 onto a light sensor 13. The sensor 13 is of a type that has spaced sensing surfaces 14,15. The line-shaped illumination beam "wraps" around a portion of the tube surface, so that the reflected beams 10,11 are arcuate in geometry, as shown at 20,21 in FIG. 2. Thus, the lens 12 projects a full image of the tube surface onto the sensor 13, which is to say that the lens 7 does not preferentially direct onto the light sensor the reflections that are coplanar with the axis of tube 8.

The Examiner will also note that the sensor areas 14,15 are shaped so that the gap G between the areas (FIG. 2) corresponds to the arc of curvature of the reflected beams 20,21. Rotation of the mirror 5 (FIG. 1) causes the reflected beams 20,21 (FIG. 2) sequentially to sweep across the gap G, which transition is sensed by the processing circuit 18 connected to the image sensor. The thickness of the glass tube is measured as a function of the time between the two beams sweeping the gap G (column 3, lines 51-53). Correspondence between the arcuate geometries of beams 20, 21 and the arcuate geometry of gap G is critical because the sensor 13 and processing circuitry 18 are designed to sense the transitions as the beams sweep across the gap. See Brand column 5, line 67 to column 6, line 2. Not only is the tube 8 not translated in a direction transverse to its axis in Brand, but the design of the optical system in Brand is such that even a small amount of translation would adversely affect the operability of the system disclosed in that reference. If the tube 8 were translated into or out of the page in FIG. 1 (in the direction of the linearty of the line-shaped illumination beam as required in present claims1 and 9), the arcuate reflected beams 20,21 would move up or down in FIG. 2 with respect to the gap G between the sensor surfaces 14,15. The gap G would then no longer match the arcuate geometry of the reflected beams, and the system would not operate as intended, if at all. Thus, as a general proposition, the Brand disclosure simply is not combinable with Gast to measure the wall thickness of glass containers as they are rotated and translated through an inspection station, as disclosed in the Gast reference.

It is therefore believed and respectfully submitted that independent claims 1, 5 and 9, together with dependent claims 2-4, 6-8 and 10-19, are clearly allowable over the proposed combination of Gast and Brand. Reconsideration is respectfully solicited.

Please charge any fees associated with this submission to Account No. 15-0875 (Owens-Illinois).

Respectfully submitted,

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Enclosure